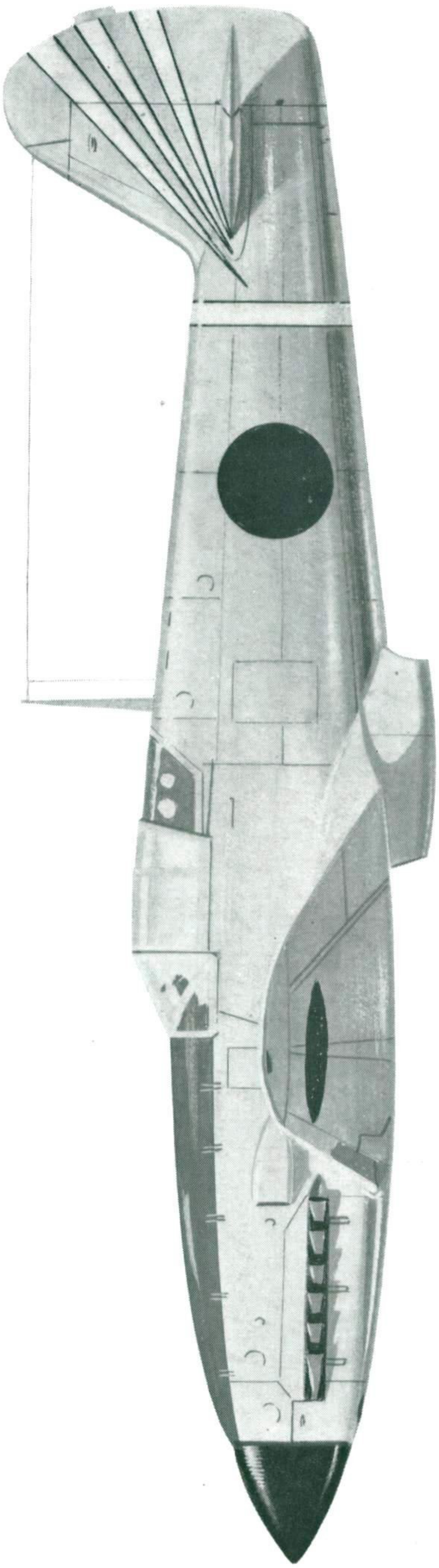
PROFILE PUBLICATIONS

The Kawasaki Ki-61 Hien

NUMBER 118

TWO SHILLINGS



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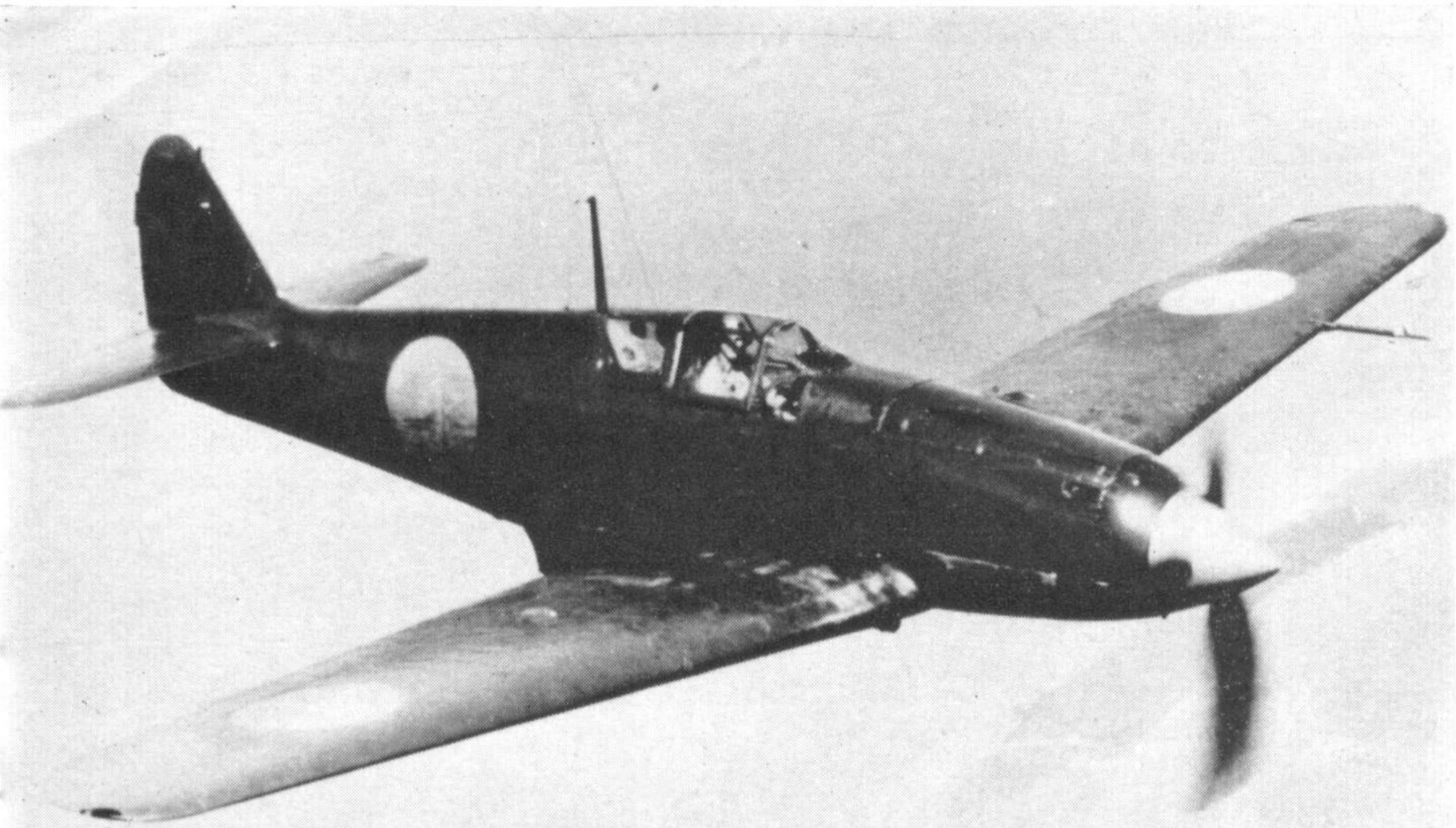
Tail insignia

KAWASAKI Ki-61-I KAIc, flown by Major Tembico Kobayashi as commanding officer of the 244th Sentai (Fighter Group) of the Imperial Japanese Army Air Force. This unit was based at Chofu airfield, Tokyo Prefecture, Japan, on home defence duties from October 1944 until the end of the war in August 1945.

Victory tally under cockpit :

5′ 10′



In-flight study of a captured Ki-61-Ib repainted in Japanese markings.
(Photo: U.S. Army via *Maru*)

The Kawasaki Ki-61 Hien

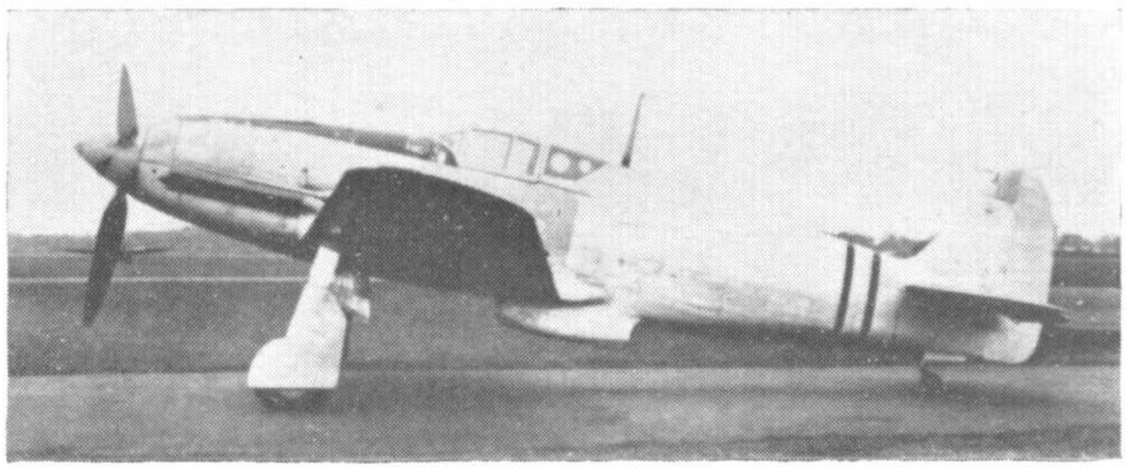
by Rene J. Francillon, Ph.D.

By the spring of 1943 the Allied fighter pilots operating in New Guinea were slowly wresting air superiority from their opponents of the Imperial Japanese Army and Navy whose Nakajima Ki-43's and Mitsubishi A6M's had until then been the scourges of the Southwest Pacific sky. Without the benefit of a radar network the Japanese forces operating in New Guinea had to rely on a primitive system of ground observers extending from the Owen Stanley Range to their airfields to warn them of impending Allied raids. All too often the Japanese pilots had to scramble madly amidst raining bombs only to be bounced by P-40's flying top cover for the Allied bombers. Caught in the most unfavourable position the Japanese fighters fell easy prey to the hit and run attacks which by now had been found the most effective against the nimble Nipponese aircraft. Even when sufficient warning was received, thus giving them a chance to avoid the escorting fighters and to engage the B-25's, B-26's and A-20's raiding their airfields and disrupting Japanese shipping, the Japanese pilots had a hard time fighting off the bombers as the Oscars* lacked pilot and fuel tank protection and, conceived as long-range aircraft for fighter versus fighter combat, carried only a light armament wholly insufficient to quickly destroy the well protected Allied bombers. On the ground, life was even more uncomfortable for the Japanese pilots who suffered from a combination of equatorial climate and diseases and incessant harassment by air bombing and naval shelling of their quarters.

For a while Allied pilots lost the grip of the situation when a new enemy fighter aircraft made its appearance over Awar and Wewak. This aircraft appeared in none of the recognition manuals yet issued to the Allied crews and initial combat reports were conflicting. All reports, however, confirmed that the aircraft was powered by a single liquid cooled engine, a type of motor not in current use in the Japanese forces with the exception of some obsolete machines such as the Kawasaki Ki-10, Perry, a biplane fighter with fixed undercarriage, and the Kawasaki Ki-32, Mary, a single-engined light bomber also with fixed undercarriage. Some pilots and Intelligence officers believed that these aircraft were German Messerschmitt Bf 109's, a type which the Allies anticipated for a long time would be manufactured under licence in Japan and which had already been assigned the Pacific code-name Mike. However, as further combat reports mentioning the new aircraft became available, it became obvious that the new aircraft was not the Bf 109 but that it had many of the recognition features of current Italian aircraft such as the Macchi C.202. On this basis Colonel Frank McCoy and his staff of the Materiel Section of the Directorate of Intelligence, Allied Air Forces, Southwest Pacific Area, agreed on the probable Italian origin of this aircraft and consequently assigned to it the code-name Tony for Antonio.

Once again the Japanese had succeeded in mystifying the Allies as Tony was neither a licence-built Bf 109 nor an Italian aircraft, but was an original Japanese design, the Army Type 3 Fighter *Hien* (Swallow) or Ki-61 built by Kawaski Kokuki Kogyo K.K. (Kawasaki Aircraft Engineering Co., Ltd.). The error in identifying correctly the origin of the Ki-61, eradicated in the summer of 1943, was understandable as the *Hien* was powered by a licence-built Daimler Benz DB 601 giving to the aircraft a strong family resemblance to the similarly-powered Mes-

The second prototype Ki-61 at Gifu in February 1942; note the additional fuselage window ahead of the windshield, partly masked by the anti-glare panel. (Photo: the author)



* *NAKAJIMA Ki-43 Hayabusa, see PROFILE No. 46.*

A Hien *with the striking tail markings of the 37th* Sentai. (Photo: via R. Ward)

serschmitt Bf 109 and Macchi C.202. Furthermore, Dr. Richard Vogt, who during the war was heading up the design team of the German aircraft concern Blohm und Voss, had been Kawasaki's chief aircraft design engineer from 1923 to 1933 and had left a lasting influence on his Japanese pupils who later on were to design aircraft bearing a close affinity to their European contemporaries.

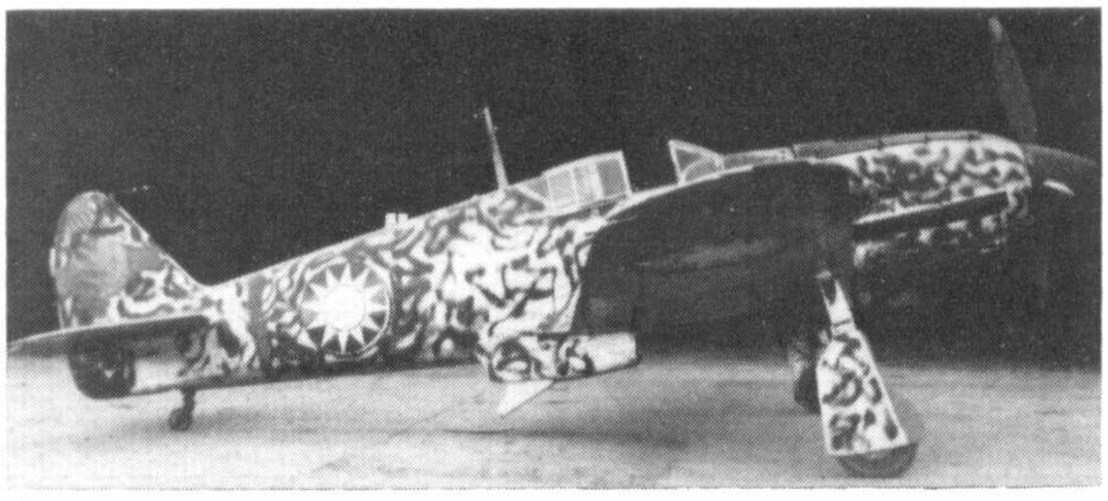
A SWALLOW IS HATCHED

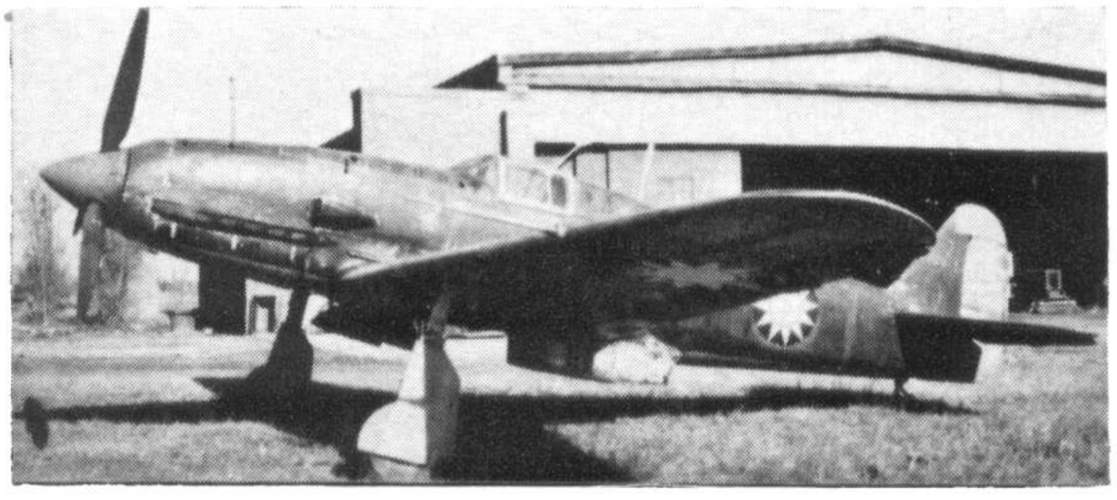
As related above Dr. Vogt had headed up the design group of Kawasaki for a ten-year period ending in 1933. During that time Kawasaki produced many important aircraft powered by the German BMW-6, a V-12 liquid-cooled engine built under licence by Kawasaki, including the Army Type 88 Reconnaissance plane (total production: 710 machines between 1927 and 1931), the Army Type 88 Light Bomber (407 aircraft between 1929 and 1932) and the Army Type 92 Fighter (385 aircraft between 1930 and 1933). Following Dr. Vogt's return to Germany, Kawasaki kept producing aircraft bearing the influence of this famous designer and continued to favour liquid-cooled inline engines at a time when all other Japanese manufacturers favoured radial engines. Aircraft of this period worth mentioning are the Kawasaki Ki-10, Perry, or Army Type 95 Fighter (588 built between 1935 and 1938) and the Army Type 98 Light Bomber or Ki-32 (854 aircraft manufactured between 1937 and 1940). However, in 1937, the Imperial Japanese Army showed its preference for lightly protected fighters with radial engines and possessing the traditional high manoeuvrability associated with Nipponese aircraft) when it selected the Nakajima Ki-27 over the European inspired, higher performing, Kawasaki Ki-28 (one V-12 liquid-cooled Kawasaki Ha-9-IIa) to replace the ageing Kawasaki Ki-10.

Despite this reversal Kawasaki kept its faith in the liquid-cooled engine as a powerplant for high performance aircraft and in March, 1938 it acquired from Daimler Benz the manufacturing rights for the series of high-power inline engines then under development by this German concern. In April, 1940, a Kawasaki technical team visited Daimler Benz in Stüttgart and brought back to Japan the blueprints for the DB 601A as well as a certain number of assembled engines to serve as production patterns. Immediately upon returning to Akashi, where Kawasaki had its engine plant, these engineers set about modifying the DB 601A to meet Japanese requirements and production techniques. In this process they boosted the take-off power to 1,175 h.p. and managed to reduce the weight slightly. In July, 1941, the first Japanese built DB 601A, designated Ha-40 by the Imperial Japanese Army, was completed and in November of the same year it had successfully passed all ground tests and was placed in production as the 1,100 h.p. Army Type 2 Engine.

Whilst Kawasaki was working on the DB 601/Ha-40 engine the Koku Hombu (Air Headquarters) of the Imperial Japanese Army followed with considerable interest the development of high-performance, liquid-cooled-engine powered fighter aircraft in England, Germany, the U.S.A., the U.S.S.R. and France. Following the start of the hostilities in Europe some staff officers of the Koku Hombu became somewhat reluctant about the established policy of sacrificing speed, armour and armament to improve manoeuvrability and of favouring radial engines over inline motors. With the forthcoming availability of the Japanese version of the DB 601 it was decided to try

Two captured Hiens *in Chinese colours. The Ho-5 cannon can be seen in the wing of the uncamouflaged Ki-61-I KAIc below.* (Photos: via R. Ward, the author)

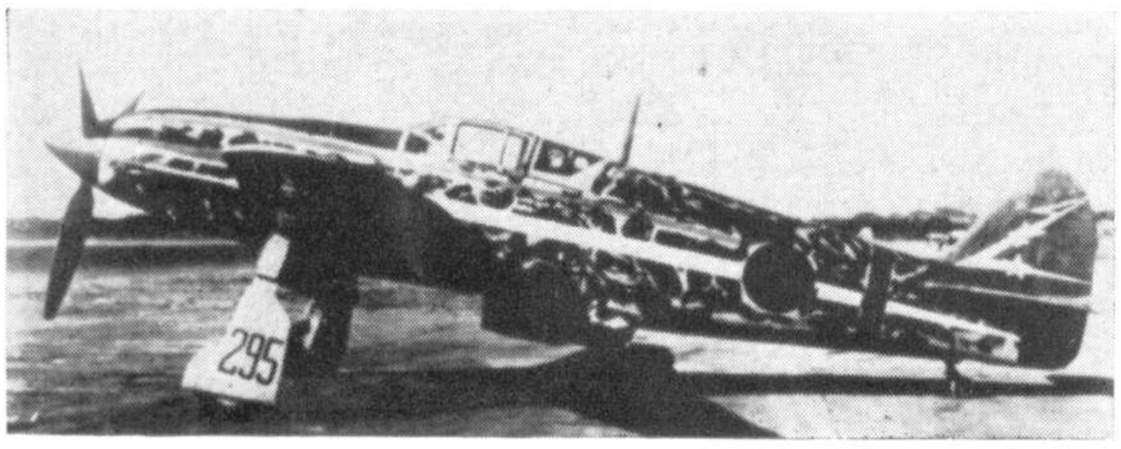




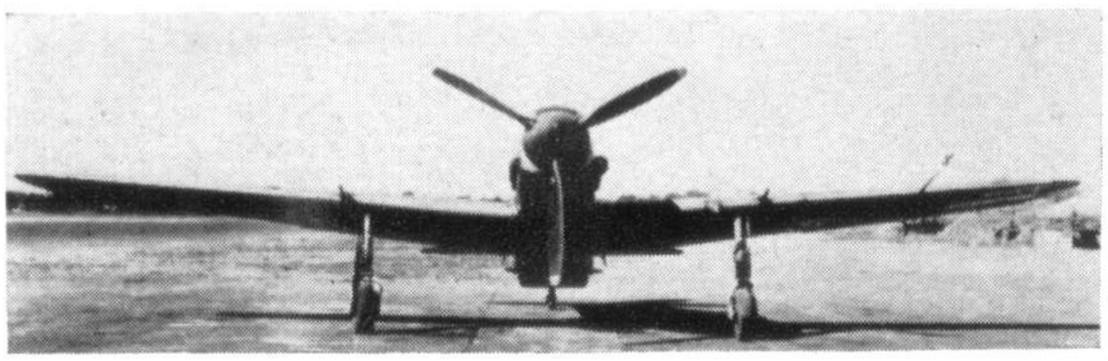
the inline engine for a new series of fighter aircraft for the Imperial Japanese Army. Accordingly Kawasaki Kokuki Kogyo K.K. was instructed in February, 1940 to initiate the design of two new single-seat fighters: the Kawasaki Ki-60, a heavy interceptor fighter, and the Ki-61, a lighter all-purpose aircraft; whereas Nakajima Hikoki K.K. was authorised to start work on a competitive design, the Ki-62 (see *Profile* No. 70, The Nakajima Ki-84).

Kawasaki selected to proceed initially with the Ki-60 of which three prototypes were manufactured in 1941. Built before the Kawasaki Ha-40 was available the three Ki-60's were powered by some of the German Daimler Benz DB 601A obtained from Germany in 1940 and differed from previous Japanese aircraft in that speed, climb rate, armament (two 20 mm. Mauser MG 151 cannons and two 12·7 mm. Ho-103 machine guns) and pilot and fuel tank protection were emphasized. However, these changes were too much for the J.A.A.F. pilots who felt that the 19·0 lbs./sq. ft. wing loading of the Ki-43-Ia was almost excessive and therefore found the 35·4 lbs./sq. ft. wing loading of the Ki-60 absolutely prohibitive.

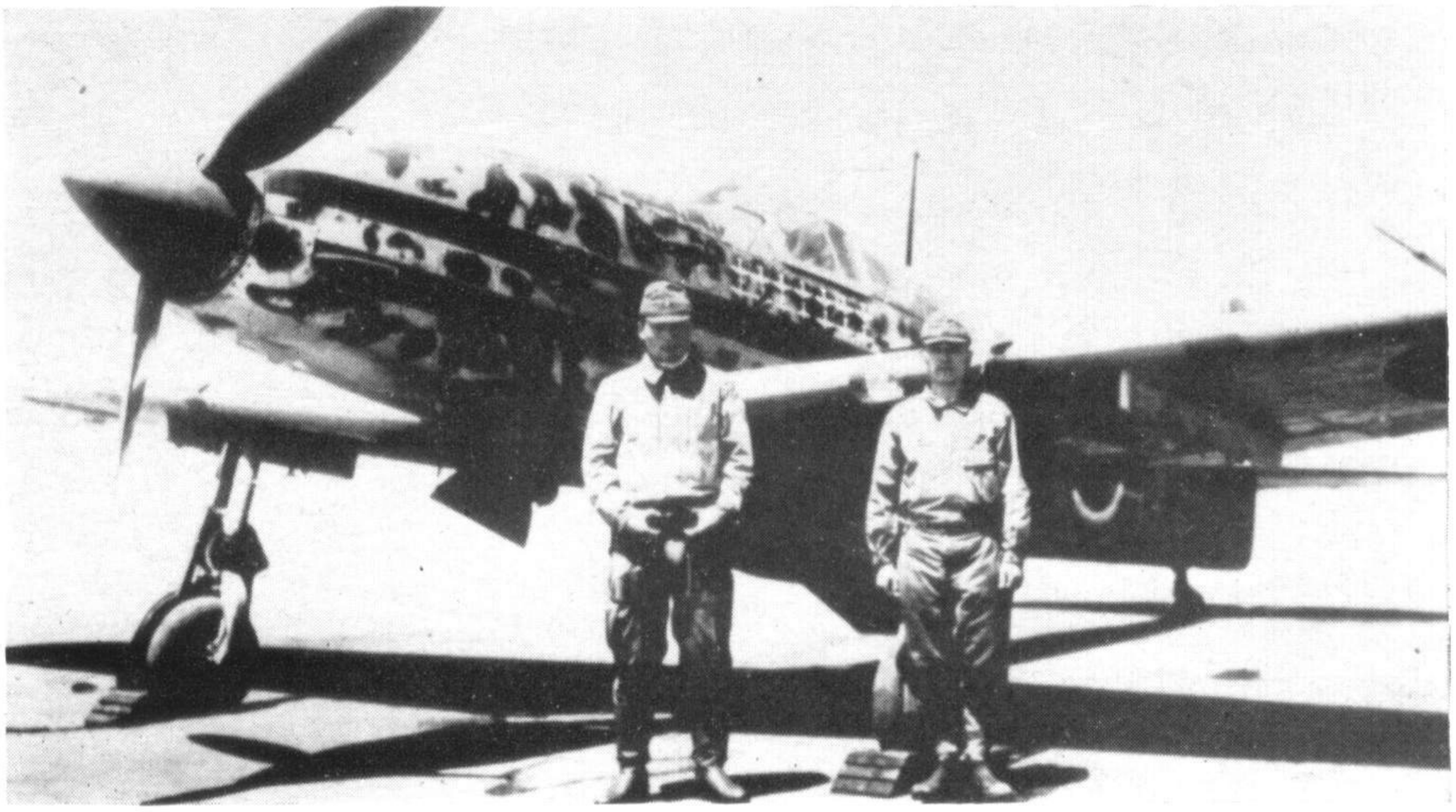
Fortunately for Kawasaki their chief engineer, Takeo Doi, freed from the major design work on the Ki-45 KAI (see *Profile* No. 105) and Ki-60, had started in December, 1940 the initial design of the Ki-61. Early in their work on the Ki-61 Takeo Doi



Gaudily-painted Army Type 3 Model 1 KAIc of the 244th Sentai; *an account of this unit's defensive activities over the Home Islands can be found in the text. Note absence of white ring around fuselage* Hinomaru. (Photo: courtesy J. F. Consiglio)



A Ki-61-Ib of the 244th Sentai with 12·7 mm. Type I machine guns protruding from the wing leading edges.
(Photo: courtesy J. F. Consiglio)

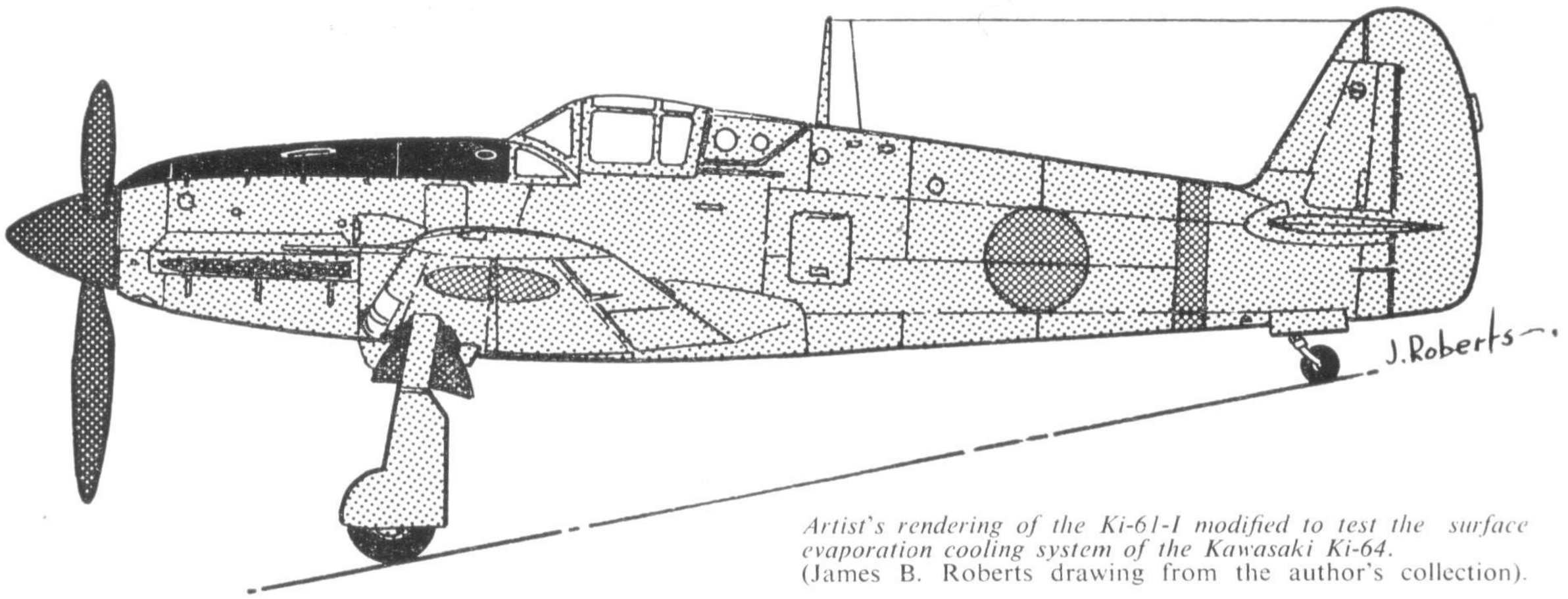


The Ki-61-I KAIc flown by Maj. Tembico Kobayashi as commanding officer of the 224th Sentai *in the closing months of the war. The fourteen aircraft silhouettes stencilled below the cockpit indicate confirmed "kills"; examples of victory tallies on Japanese aircraft are rare, as rank, social class and seniority within the unit were all taken into consideration when evaluating a pilot's activities. Promotion of N.C.O. pilots to commissioned rank was against all traditional military attitudes; and it was unthinkable, for instance, that a sergeant-pilot should be allowed to display more victories than his commissioned superiors, whether or not he was a more competent fighter pilot.* (Photo: courtesy J. F. Consiglio; for colour details of this aircraft see the five-aspect painting by P. Endsleigh Castle on p.2 of this *Profile*).

and his deputy Shin Owada decided to improve upon the Ki-60 in two major areas: manoeuvrability and speed (the Ki-60 had achieved only 354 m.p.h. when design estimates indicated a maximum speed of 375 m.p.h.). To improve manoeuvrability a wing of higher aspect ratio (7·2) with an area of 215·278 sq. ft. (the first Ki-60 had a wing area of only 171·146 sq. ft. whilst the second and third prototypes had their wing area increased to 174·376 sq. ft.) was selected and every conceivable weight saving technique not affecting performance, ease of production and protection was applied. To improve speed a smaller cross-section fuselage was adopted and the engine installation was cleaned up, the oil cooler intake being removed from under the engine cowling and incorporated in a smaller ventral radiator moved further back. Armament was also reduced to two 12·7 mm. Type 1 machine guns in the upper fuselage decking and either two 7·7 mm. Type 89 or two 12·7 mm. Type 1 machine guns in the wing. Furthermore fuel capacity was increased from 410 litres (108·3 U.S. gallons) to 550 litres (145·3 U.S. gallons) to suit the aircraft to its intended use as an all-purpose fighter. Finally the landing gear track was increased from 9 ft. 10 in. on the Ki-60 to 13 ft. 1½ in. on the Ki-61 to cater for operations from primitive forward fields.

A SWALLOW TAKES TO THE AIR

Detailed design progressed rapidly and the first prototype was rolled out from the Kagamigahara factory, in Gifu Prefecture, north of Nagoya, in early December, 1941. During the same month the aircraft took to the air and met the most sanguine hope of the elated Takeo Doi; early test flights reassured the Koku Hombu and the officials of the Ministry of Munitions which had authorized Kawasaki to set up an assembly line before the fighter's first flight. An



Artist's rendering of the Ki-61-I modified to test the surface evaporation cooling system of the Kawasaki Ki-64.
(James B. Roberts drawing from the author's collection).

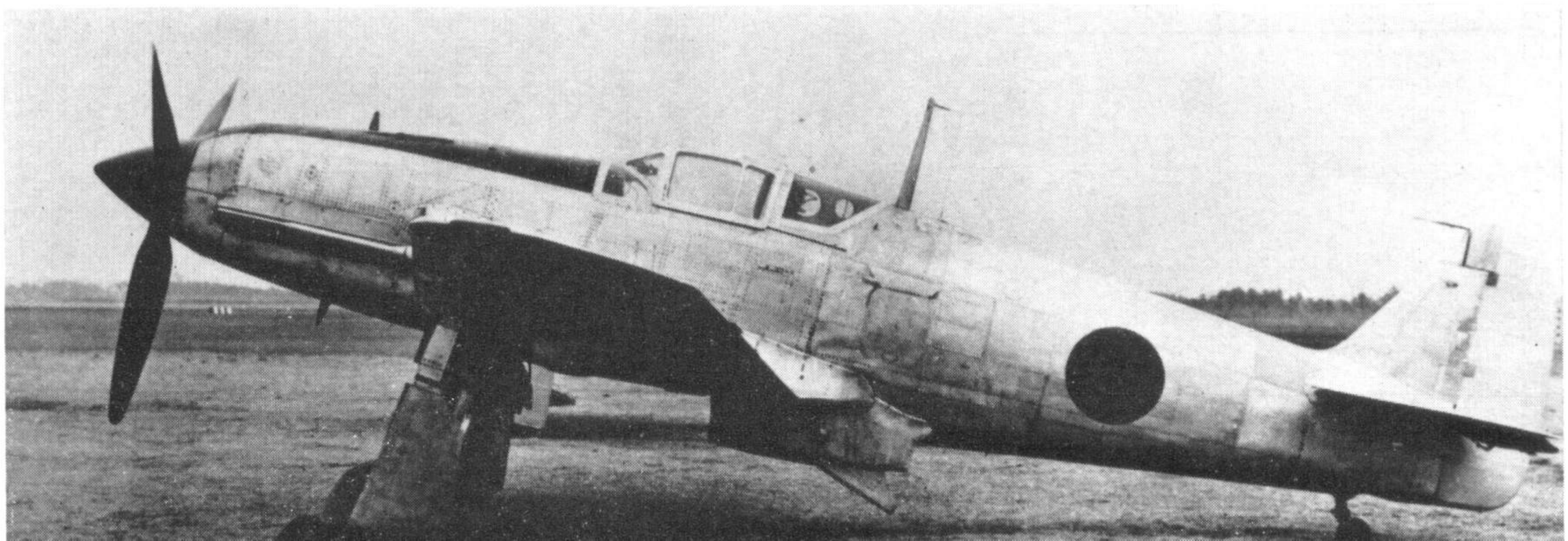
additional eleven prototypes were delivered to the Imperial Japanese Army which initiated an intensive programme of flight trials. The service pilots were at first only partially satisfied as the 30 lbs./sq. ft. wing loading of the Ki-61, although representing a sizeable improvement over that of the Ki-60, was still high by Japanese standards. However, experienced pilots returning from the battlefront were enthusiastic over the fighter's self-sealing fuel tanks, its armament heavier than that of current service aircraft, and its armour protection. They also acclaimed the high diving speed of the aircraft which they saw as a great asset in meeting the hit and run attacks from higher altitudes which Allied pilots favoured against the nimble Japanese aircraft. But it took a series of comparative trials against the Nakajima Ki-43-II, Oscar, and Ki-44-I, Tojo, an imported Messerschmitt Bf 109E-3 (two of these aircraft having been bought by the Japanese Imperial Army) and a Curtiss P-40E (several aircraft of this type had been captured in the Philippines and the Dutch East Indies) to dissipate the doubts of the test pilots and of the most traditionalistic officers of the J.A.A.F. Reaching a maximum speed of 367 m.p.h. at 19,685 ft., the Ki-61 proved to be the fastest aircraft during the competitive trials and, although less manoevrable than the Ki-43-II, it had no difficulty in out-manoeuvring its other opponents.

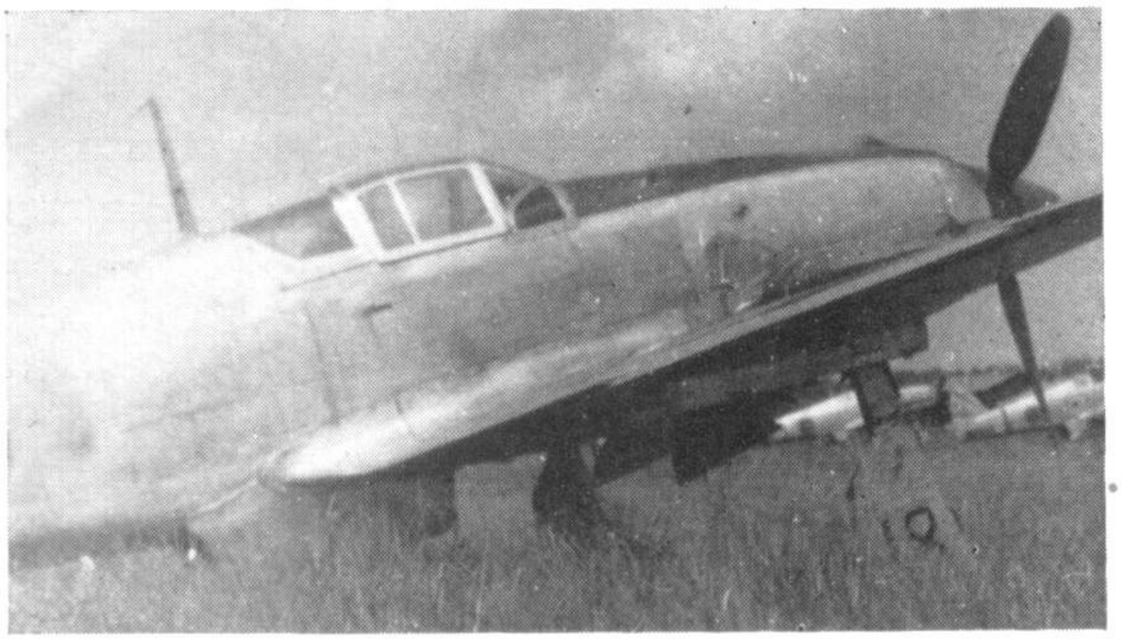
The thirteenth Ki-61 delivered to the Imperial Japanese Army in August, 1942 was the first machine built with production tooling and differed from the prototypes in minor internal details. The only recognition feature was the discard of the small window located on each side of the cowling just ahead of the forward portion of the windshield. With the final acceptance of the aircraft in the latter part of 1942 as a service type designated Army Type 3 Fighter Model 1 *Hien* (Ki-61-I) production slowly gained tempo and thirty-four production aircraft were delivered by the end of the year. Two versions of the aircraft were then manufactured: the Ki-61-Ia, armed with two fuselage-mounted 12·7 mm. Type 1 machine guns and two wing-mounted 7·7 Type 89 machine guns, and the Ki-61-IB in which the wing-mounted light machine guns were replaced by two 12·7 mm. Type 1 machine guns.

THE SWALLOW'S FIRST SPRING

One swallow does not make a spring; but the *Hien* (Swallow) did announce a new era for the fighter elements of the Imperial Japanese Army when it was first delivered in the month of February to the 23rd Dokuritsu Dai Shijugo Chutai (Independent Squadron) for pilot conversion and combat training. However, appropriately enough for swallows, the *Hiens* made their operational début with the 68th and 78th Sentais (Groups) in the spring of 1943 in New Guinea. Soon these aircraft were met over a wide area covering the northern coast of New Guinea, the Admiralty Islands, New Britain and New Ireland; and Allied pilots learned a painful lesson when they tried to escape from this new foe by using their previously unchallenged technique of diving away at high speed. In operation the *Hien* proved to be relatively trouble-free with the exception of some minor teething problems with the engine and a tendency for the powerplant to overheat during

The underwing fairings indicate that this Hien *was one of the 388 Ki-61-I's modified to carry Mauser MG 151 20 mm. cannons in the wings.*
(Photo via *Maru*)





Rare photograph of 18th Sentai *Ki-61-I KAIc's at Chofu, near Tokyo, in the spring of 1945.*
(Photo: Takeshi Hattori via the author)

Ki-61-I KAIc of the 19th Sentai, *photographed in the Philippines on 1st April 1945.* (Photo: the author)

ground operation under equatorial conditions. Thanks to the good cockpit and fuel tank protection the Japanese pilots were able to press their attacks to closer range.

Shortly after the aircraft's service début, a Ki-61-Ia was modified experimentally at Kawasaki's Akashi plant to test the surface evaporation cooling system which the Company wanted to use on a new fighter, the Ki-64, then under development. The large ventral radiator was replaced by a smaller retractable unit for use during ground operation only whilst cooling was provided in flight by steam evaporation through condensers in the wing. Thus fitted the experimental aircraft attained a maximum speed of 391 m.p.h., the highest speed attained by any Ki-61.

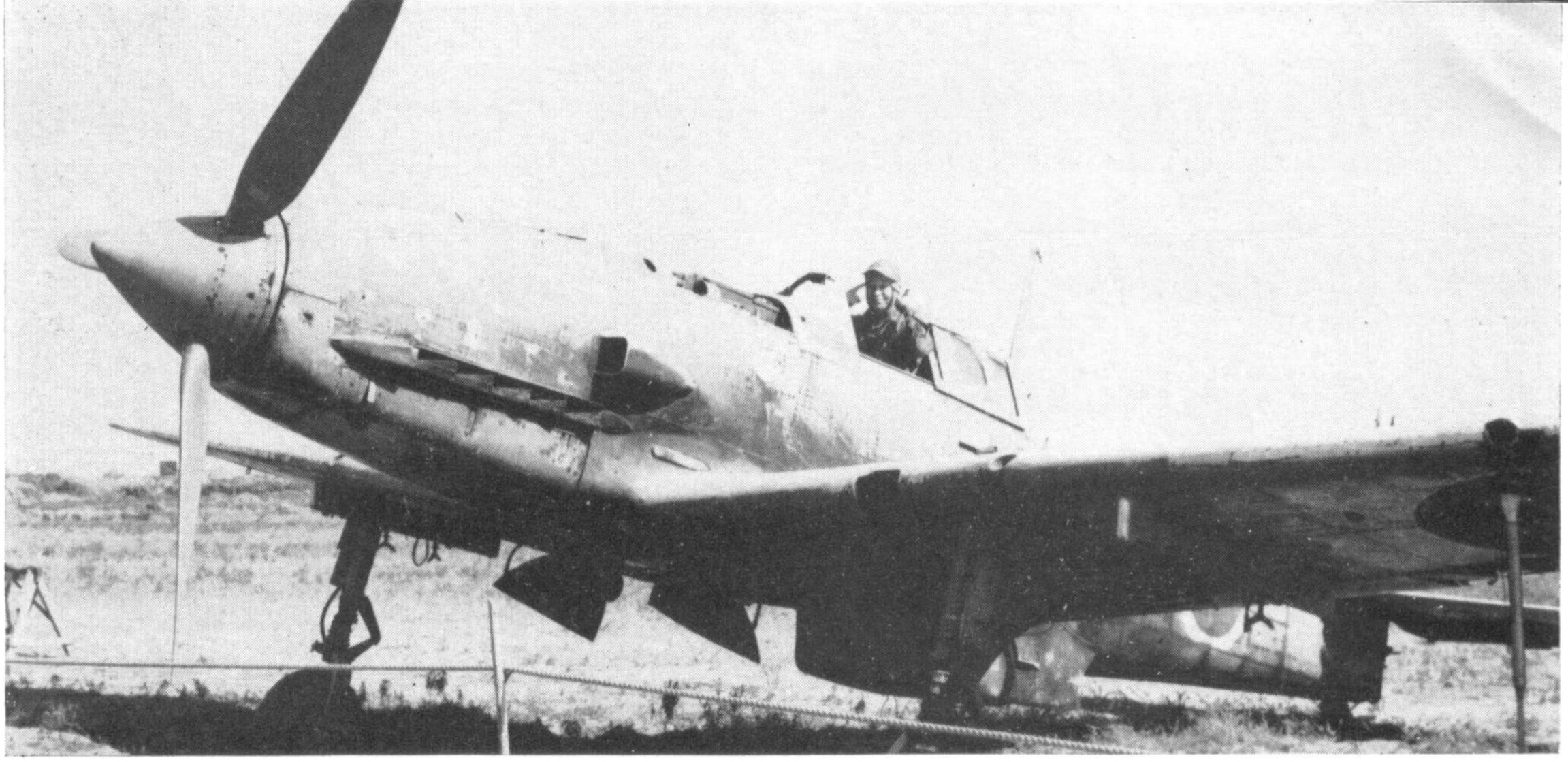
Although the Ki-61's armament represented a 100 per cent. increase over that of the Ki-43, Japanese pilots still experienced difficulties in scoring quick, clean victories over the well protected Allied bombers. This problem had been foreseen and, pending availability of indigenous 20 mm. cannons, it was decided to install a pair of German 20 mm. Mauser MG 151 of which eight hundred had been received in August 1943. Kawasaki modified on the assembly line 388 Ki-61-Ia and -Ib airframes to mount one MG 151 in each wing in place of the standard machine gun. The modifications consisted of some local strengthening and in laying the cannons on their side with a small fairing being added underwing.

As the Japanese 20 mm. Ho-5 cannon became available it was decided to mount a pair of these weapons in the upper fuselage decking of a new version of the *Hien* and, at the same time, to introduce some modifications dictated by a necessity to simplify production and field maintenance. The new model, designated Ki-61-I KAIc (KAI being the abbreviation for Kaizo, meaning modified), was characterized by a longer fuselage (+0·19 metre) with detachable rear section, the replacement of the retractable tail wheel by a fixed unit, the strengthening of the wings, the fitting of fixed underwing pylons outboard of the main undercarriage attachment points and minor modifications of the controls. This version was manufactured at Kagamigahara in parallel with the Ki-61-Ib starting in January, 1944, finally supplanting the earlier model in August of the same year. A few Ki-61-I KAId's, a specialized bomber interceptor armed with two 12·7 mm. fuselage guns and two 30 mm. wing cannons, were also produced during the latter part of 1944. Although the Ki-61-I KAIc remained in production for one year only this version accounted for over half of the *Hiens*, as production exceeded one hundred machines per month from November 1943 onward and reached a peak of 254 aircraft in July, 1944. By January, 1945, the Ki-61-I and Ki-61-I KAI were phased out of production following delivery of the 2,734th machine.

THE SWALLOW DISSECTED

The Kawasaki Ki-61-I KAIc *Hien* was a single-seater, low-wing monoplane of conventional design.
Fuselage: Oval section, all-metal structure built in three sections with a flush-riveted, stressed-skin covering. The engine mounting and cowling, with the engine supercharger on the port side, and the barrels of the two 20 mm. Ho-5 cannons formed the forward section which extended to the first firewall. The cannon breeches, ammunition boxes, oil tank and forward fuselage fuel tank were located between the two firewalls. The centre section also incorporated the cockpit, the ventral radiator and the main fuselage fuel tank. The pilot sat over the rear wing spar under a three-part canopy with sliding central section and was protected by an armoured windshield, a 13 mm. head and back armour plate and a turnover pylon. The radio equipment was mounted in a detachable rear fuselage section.
Wings: All-metal, three-spar wings of equal taper with light-alloy stressed-skin covering. Split flaps between ailerons and fuselage. Provision was made in the wings for two machine guns, two fuel tanks, wheel-wells and fixed underwing racks, one outboard of each machine gun. The ailerons were of metal structure with fabric covering and were fitted with trim tabs adjustable on the ground only.
Tail: All-metal framework with metal-covered fixed surfaces and fabric-covered elevators and rudder.

A row of 19th Sentai *aircraft on Leyte in 1945.* (Photo: the author)



Captured Model 1C Hien *of the 105th* Sentai *photographed on Okinawa, 13th April 1945.* (Photo: the author)

The rudder was fitted with a trim tab adjustable on the ground only whilst each elevator had both a ground adjustable trim tab and a controllable trim tab.

Undercarriage: The main gear retracted hydraulically inboard and horizontally into the wings and was fully covered by flush-fitting doors. The main wheels were fitted with hydraulic brakes. The free-swivelling tailwheel was non-retractable.

Armament: Two 12·7 mm. Type 1 (Ho-103) machine guns with 200 r.p.g. in the wings outboard of the undercarriage. Two 20 mm. Ho-5 synchronized cannons with 120 r.p.g. in the forward fuselage upper decking. Underwing racks for two bombs of up to 550 lbs.

Engine: One 12-cylinder inverted V liquid-cooled 1,100 h.p. Army Type 2 Model 22 (Ha-60-22, this being the engine designation under the unified Army/Navy nomenclature whilst Ha-40 was the old Army designation) developing 1,175 h.p. at 2,500 r.p.m. on take-off, and 1,100 h.p. at 12,800 ft. (3,900 m.) and driving a 9 ft. 10 in. three-blade constant speed airscrew.

Fuel System: Two self-sealing fuselage fuel tanks and two self-sealing wing fuel tanks with a total capacity of 550 litres (145·3 U.S. gallons). A 200-litre (53 U.S. gallons) drop-tank could be carried under each wing.

THE SWALLOW'S PROGENY

As production gained tempo *Hiens* were deployed by the Imperial Japanese Army in most theatres of operation. However, during 1943, they were met in large numbers in the Southwest Pacific Area, forcing General Kenney to appeal even more strongly to General Arnold to release some of the much-needed P-38's, previously assigned in priority to the E.T.O., to restore the balance of power, as the Allied P-40's were outclassed when flown by all but the most experienced pilots. For the Japanese the situation was not as favourable as might appear as their aircraft industry was quickly falling behind both in number of aircraft produced and in workmanship. In this latter respect, the Ki-61 was one of the hardest hit programmes largely because of its inline engine which suffered increasingly from its faulty oil system and from main bearing failures.

Comparatively few Ki-61's saw operation in China but the aircraft was quite active in the defence of the Philippines where the *Hien*-equipped 17th, 18th and 19th Sentais operated over Leyte. Following the loss of the Philippines the 19th, 37th and 105th Sentais and the 23rd Dokuritsu Dai Shijugo Chutai were deployed to Formosa and Okinawa, being reinforced on Okinawa only by the 59th Sentai where they suffered heavy losses at the hands of the more numerous Allied forces.

Even before the acceptance of the Ki-61-I Kawasaki had been urged by the J.A.A.F. to develop an advanced version of the *Hien* offering increased performance. To meet this requirement Kawasaki relied on a development of the Ha-40, which they hoped could be rated at 1,500 h.p. on take-off, 1,350 h.p. at 6,560 ft. and 1,250 h.p. at 18,700 ft. To take full advantage of the increased rating at altitude Takeo Doi decided to increase the wing area of the aircraft by ten per cent. to 236·8 sq. ft. and to improve the rear vision from the cockpit by redesigning the fixed aft portion of the canopy. The first prototype of this new version, designated Ki-61-II, was completed in August, 1943 and by January, 1944 ten additional airframes had been completed. However, as the Ha-140 development ran into serious difficulties only eight Ki-61-II's received their powerplant. Flight tests proved to be very disappointing as the aircraft suffered from constant engine troubles, wing structural failures and comparatively poor handling characteristics.

Whilst working feverishly to improve the reliability of the Ha-140, Kawasaki modified the ninth Ki-61-II in an effort to solve the structural and handling problems. The extended wing was replaced by a standard Ki-61-I wing, the fuselage length was increased from 8·94 metres to 9·16 metres and the rudder area was increased to cope with the increased side area of the fuselage, resulting in the Ki-61-II KAI which first flew in April, 1944. Thirty additional similar machines were produced and participated in an extensive flight trial programme. When the Ha-140 engine was functioning smoothly the Ki-61-II KAI demonstrated some remarkable performances as an

interceptor being able to climb to 16,450 ft. in six minutes, to reach a maximum speed of 379 m.p.h. at 19,685 ft. and to perform easily all combat manoeuvres up to 31,200 ft. whilst having a service ceiling of 36,100 ft. Still hoping that the Ha-140 could be rendered reliable the Ministry of Munitions authorized Kawasaki in September, 1944 to place the aircraft in production as the Army Type 3 Fighter Model 2. Before the end of the war 374 Ki-61-II KAIa, armed with two 20 mm. fuselage cannons and two 12·7 mm. wing guns, and Ki-61-II KAIb, in which the wing guns were supplanted by 20 mm. cannons, were completed at Kagamigahara. However, the luckless Ha-140 was struck a final blow when, on 19th January, 1945, the 20th Air Force destroyed the Akashi engine plant. Prior to this fatal event only ninety-nine Ki-61-II KAI airframes out of the 374 produced had been matched with their powerplant and, of these aircraft, one third were destroyed by air bombings prior to reaching combat units. Soon thereafter, in one of the greatest engineering feats of the war, the 275 engineless Ki-61-II KAI airframes were matched with 1,500 h.p. Mitsubishi Ha-112-II 14-cyl. double-row air-cooled radial engine resulting in the Army Type 5 Fighter (Ki-100), the story of which falls beyond the scope of the present article.

The last experiment carried with the *Hien* was the fitting of an all-around-vision canopy to a modified Ki-61-II KAI with cut-down rear fuselage. This modification was too late to be incorporated in production *Hiens* but the feature was used on late production Ki-100's.

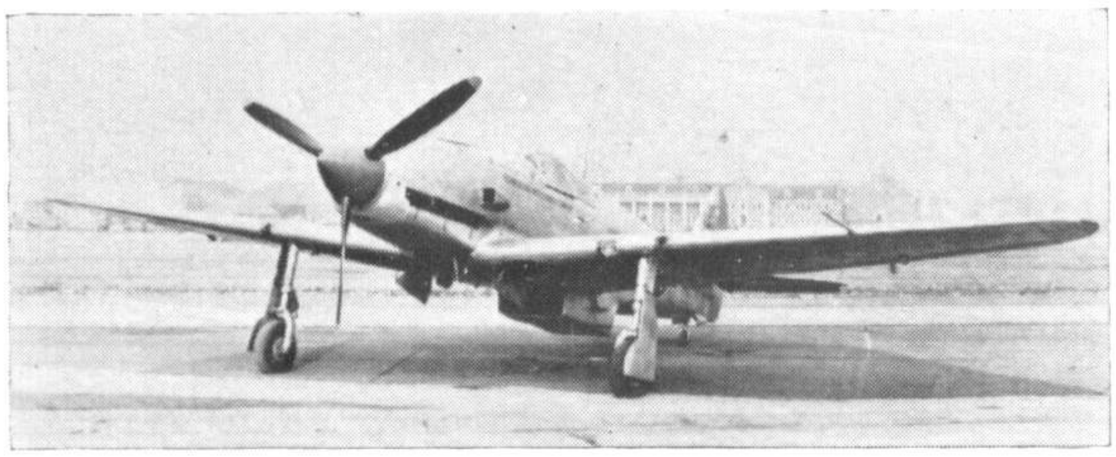
THE SWALLOW'S LAST SPRING

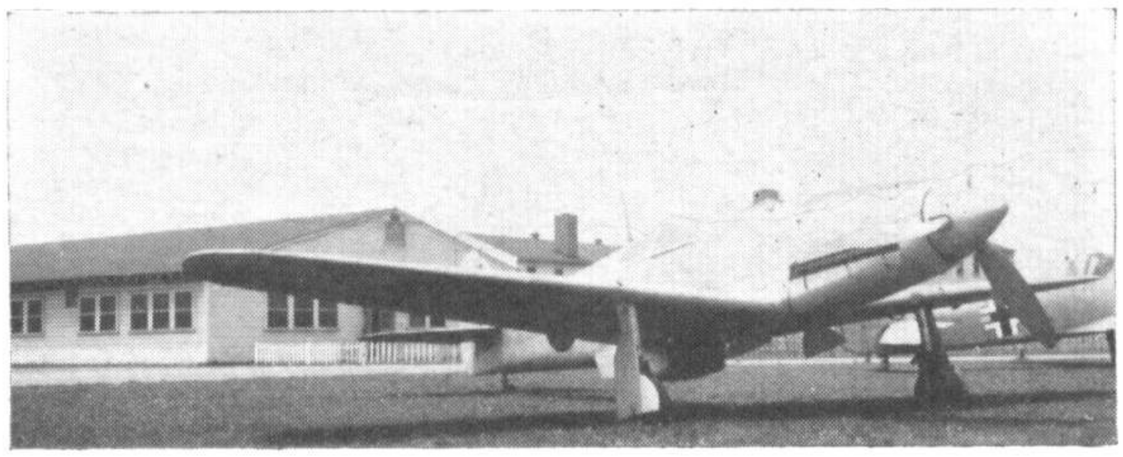
Following the loss of the Philippines and the initial raids by China-based B-29's the Imperial Japanese Army assigned a large number of its fighter units to the defence of the homeland. *Hien*-equipped units thus affected were the 18th, 23rd, 28th and 244th Sentais in the Tokyo area, the 55th and 56th Sentais in Central Japan and the 59th Sentai in Western Japan.

Undoubtedly the most representative and famous of these Sentais was the 244th, led by Major Kobayashi, whose aircraft is shown in the five-view drawing. The administrative and ground staff of the 244th Sentai was brought together in April, 1944 but the unit was only activated in the following October. As most pilots came from battle tested units Major Kobayashi and his three Chutai leaders: Major Fujita (1st Chutai) and Captains Takada (2nd) and Muraoka (3rd), competently seconded by Captain Mitami, the C.O. of the Maintenance Chutai, were able to declare the Sentai operational in November, 1944. The original equipment consisted mostly of Ki-61-I KAIc with some Ki-61-Ib inherited from other units. As time went by some of the attritions were replaced by Ki-61-II KAI whilst a few Ki-61-I

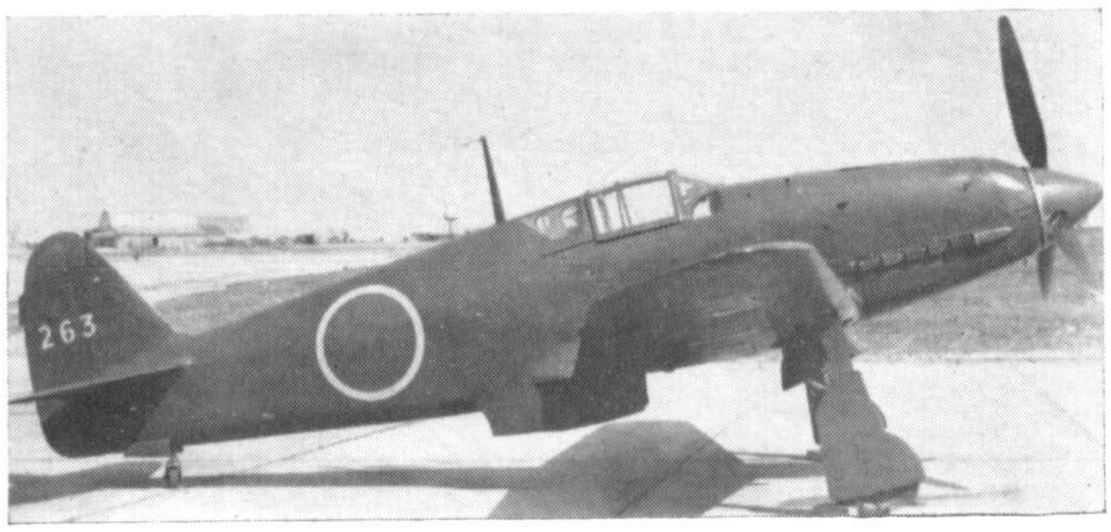
SERVICE DEPLOYMENT OF THE Ki-61 HIEN

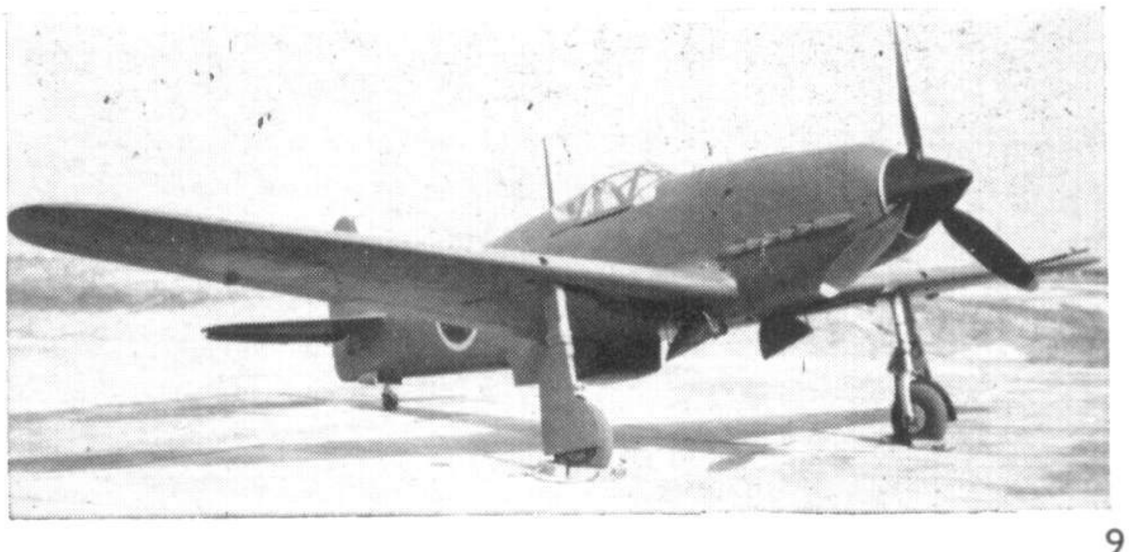
Unit	Period	Theatres of Operation
17th Sentai	Feb. 1944–Aug. 1945	Japan, Philippines.
18th Sentai	Feb. 1944–Aug. 1945	Japan, Philippines, Japan (Tokyo area).
19th Sentai	Feb. 1944–Aug. 1945	Japan, Philippines, Formosa, Okinawa.
23rd Sentai	Apr. 1944–Aug. 1945	Japan (Tokyo area).
28th Sentai	Aug. 1945	Japan (Tokyo area).
37th Sentai	1944–1945	Formosa, Okinawa.
55th Sentai	May 1944–Aug. 1945	Japan (Central).
56th Sentai	April 1944–Aug. 1945	Japan (Central).
59th Sentai	1944–1945	Okinawa, Japan (Western).
68th Sentai	Mar. 1943–Apr. 1944	Manchuria, Japan, New Guinea, Rabaul, Admiralty Is.
78th Sentai	? 1943–Aug. 1944	New Guinea, Rabaul, Admiralty Islands.
105th Sentai	Sept. 1944–Aug. 1945	Japan, Formosa, Okinawa.
244th Sentai	Oct. 1944–Aug. 1945	Japan (Narumatsu, Chofu).
23rd Dokuritsu Dai Shijugo Chutai	Feb. 1943–Aug. 1945	Japan, Formosa, Okinawa.
Akeno Fighter Training School 8th Kyo-iku Hikotai (Training Squadron) 5th, 7th, 11th, 16th and 18th Rensei Hikotai (Operational Training Unit)		Japan

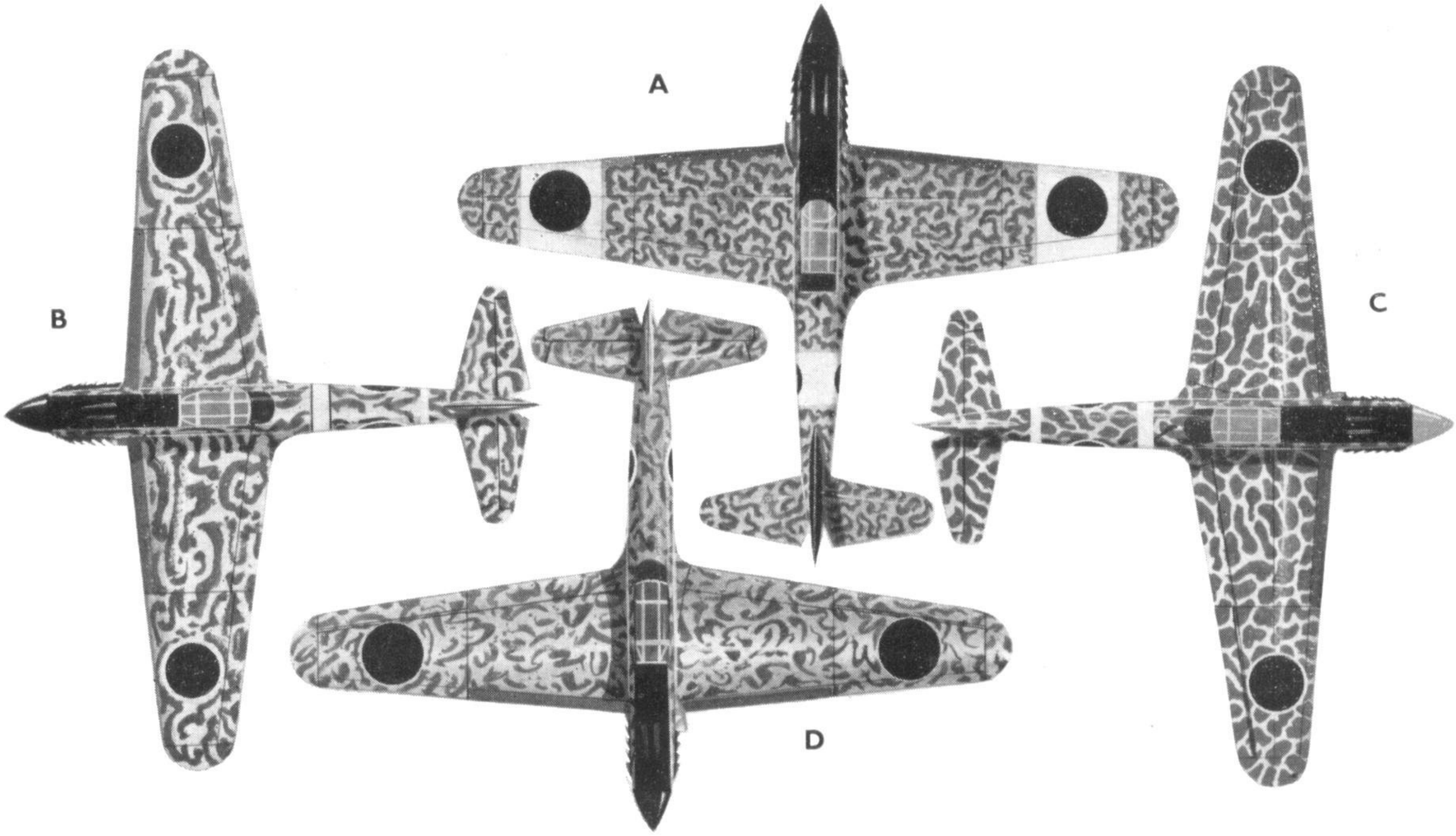




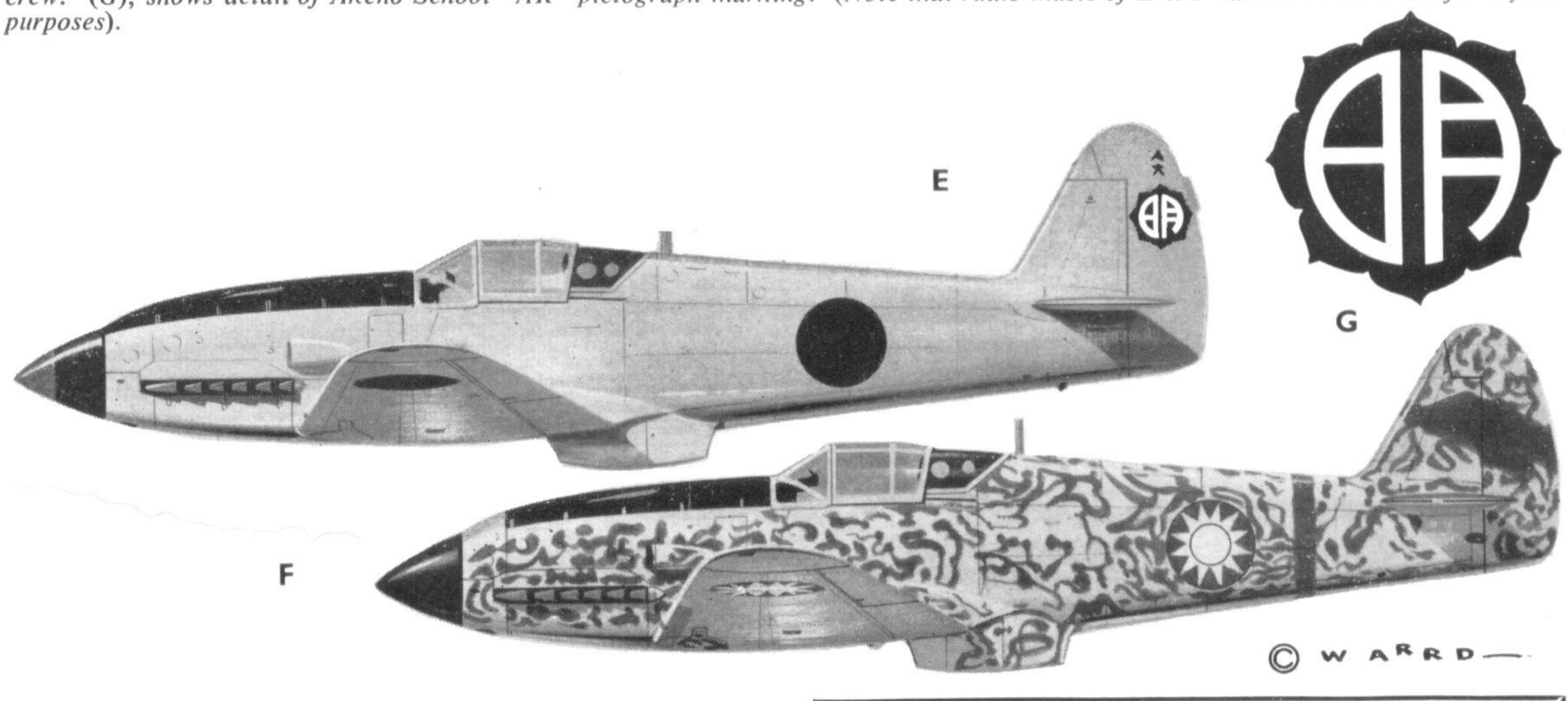
Various views of captured Hiens: top, *a Model 1A in the markings of the Technical Air Intelligence Centre, Southwest Pacific Area* (Photo: U.S. Army via the author); *a Model 2A photographed in the U.S.A. besides a captured Fw 190* (Photo: the author); *and two views of a captured Ki-61-Ib repainted in Japanese markings after flight test evaluation at Wright Field, Ohio, in 1945.* (Photos: U.S. Army via the author).







(*Note that for brevity in captions, Sentai—Ftr. Gr., Chutai—Squadron*).
Above: *typical upper surface camouflage patterns.* (*A*) *Ki-61-II of 244th Ftr. Gr.;* (*B*), *Ki-61-I of 68th Ftr. Gr., second a/c on opposite page;* (*C*) *Ki-61-I of 68th Ftr. Gr., top a/c on opposite page;* (*D*) *Ki-61-I of 248th Ftr. Grp.* Below: (*E*), *Ki-61-I of Akeno Fighter Training School; bare metal, black anti-glare panel, red spinner with yellow tip, black and white rudder insignia.* Below: (*F*), *Ki-61-I captured by Chinese, J.A.A.F. combat stripe and unit emblem painted out, red spinner and yellow wing stripe retained. Chinese marking in blue and white. These a/c flown for a period after end of W.W.II by Chinese pilots, serviced by J.A.A.F. ground crew.* (*G*), *shows detail of Akeno School "AK" pictograph marking.* (*Note that radio masts of E & F have been cut short for layout purposes*).



KAId with 30 mm. cannons were tested. In their fights against the B-29's Major Kobayashi emphasized to his pilots the following points: (1) As the Ki-61 could seldom jump the bombers from above the frontal attack should be selected; (2) when the bombers were intercepted on their way to the targets it was preferable to damage several aircraft rather than destroy one as the crippled bombers were forced to release their bombs prematurely and fell easy prey during their long solitary flight back; (3) attacks should be pressed to close range and, if necessary, ramming attacks should be performed. Major Kobayashi himself gave the example by pressing his attacks under almost suicidal conditions.

PRODUCTION

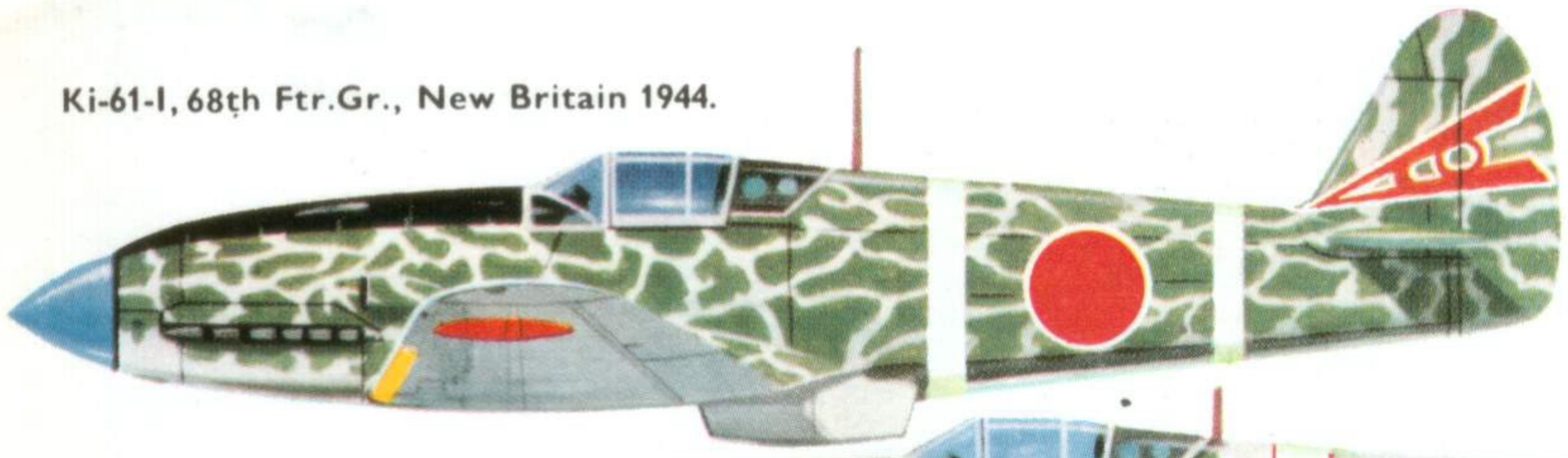
All Ki-61's were built by Kawasaki Kokuki K. K. in its Kagamigahara plant.

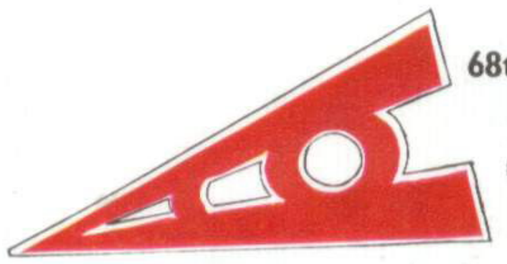
12	Ki-61 prototypes (1941–1942).
2,734	Ki-61-I and Ki-61-I KAI (Aug. 1942–Jan. 1945)
8	Ki-61-II (Aug. 1943–Jan. 1944).
31	Ki-61-II KAI prototypes (April 1944–Sept. 1944).
374	Ki-61-II KAI (Sept. 1944–Aug. 1945).
3,159	

Or:

1	(1941).
45	(1942).
717	(1943).
2,212	(1944).
184	(1945).
3,159	

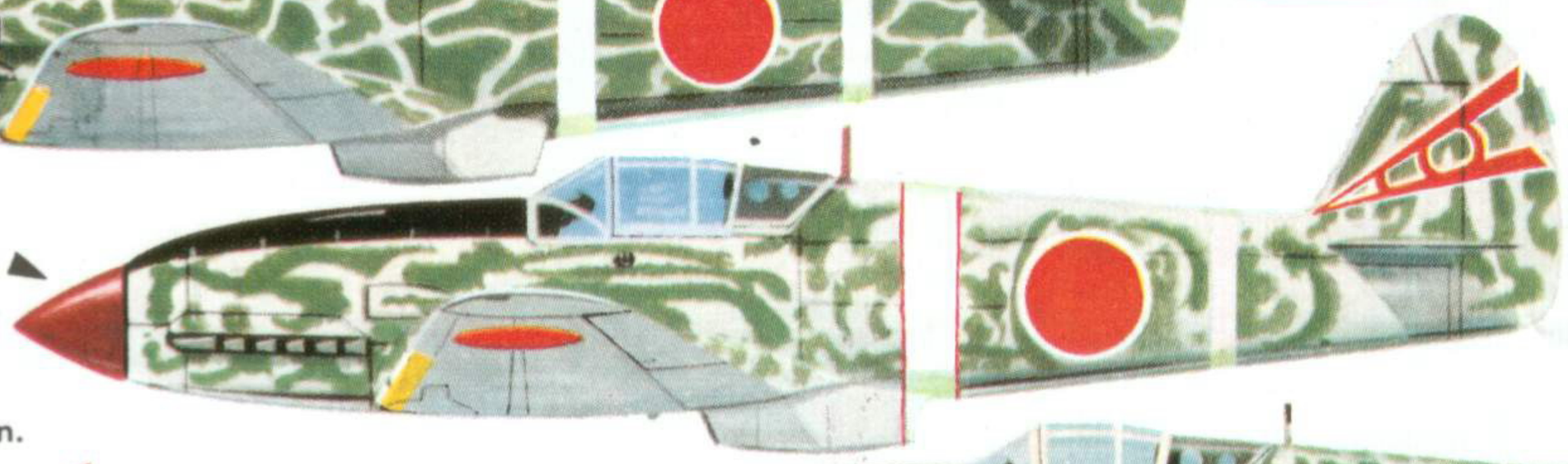
Ki-61-I, 68th Ftr.Gr., New Britain 1944.





68th Ftr.Gr. Tails of "V" extended to edge of rudder on some a/c.

Ki-61-I, 68th Ftr.Gr., New Britain 1944.

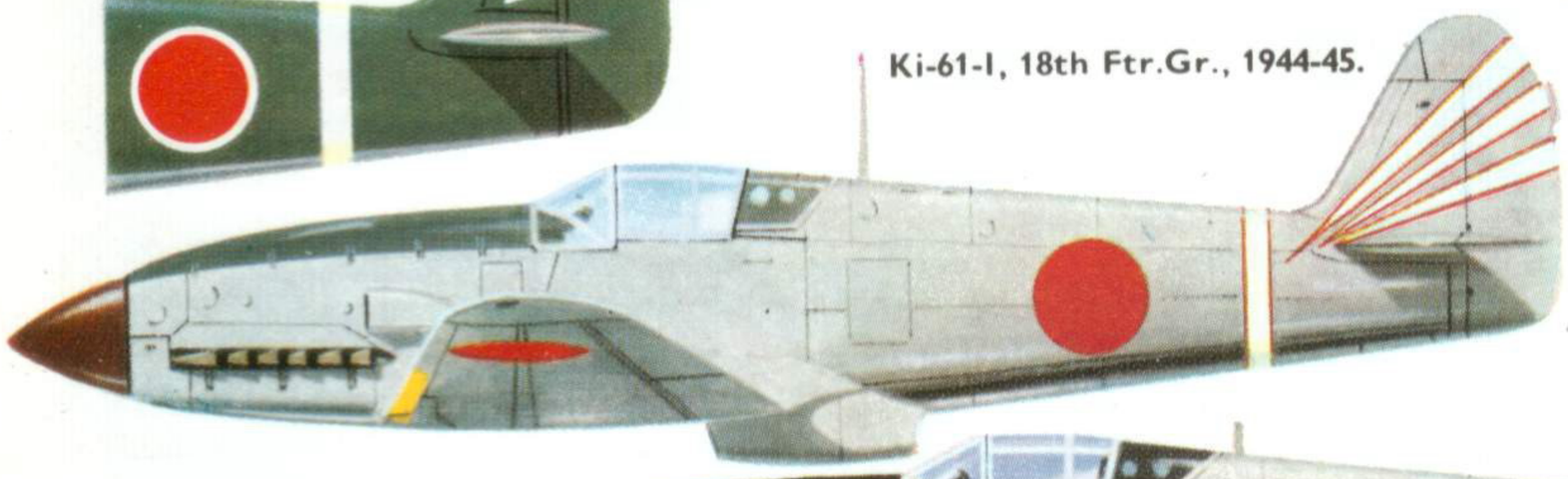


Ki-61-I, 244th Ftr.Gr.; five victory tallies under cockpit.

59th Ftr.Gr., 2nd Sqdn.

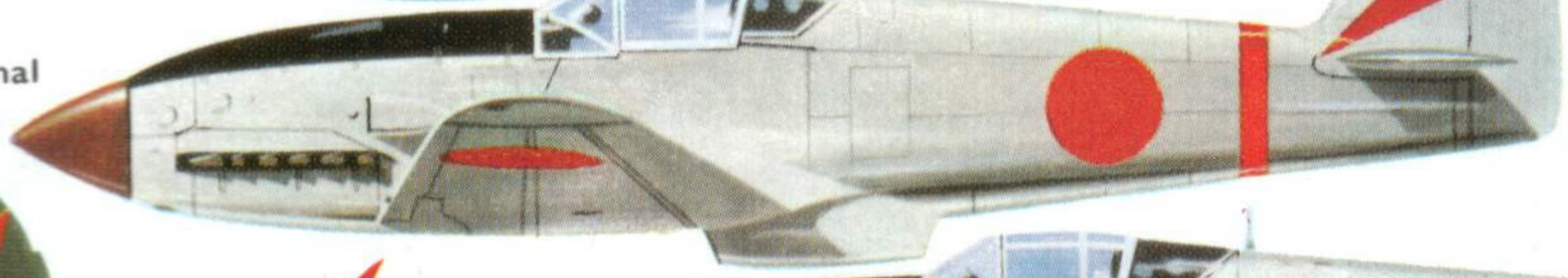
59th Ftr.Gr., 1st Sqdn.

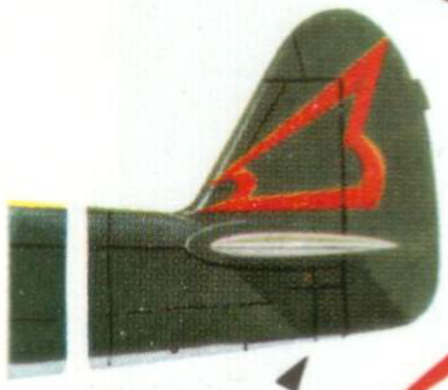
Ki-61-I, 18th Ftr.Gr., 1944-45.



105th Ftr.Gr., 3rd Sqdn., 1944-45.

Ki-61-I, 5th Operational Training Group.

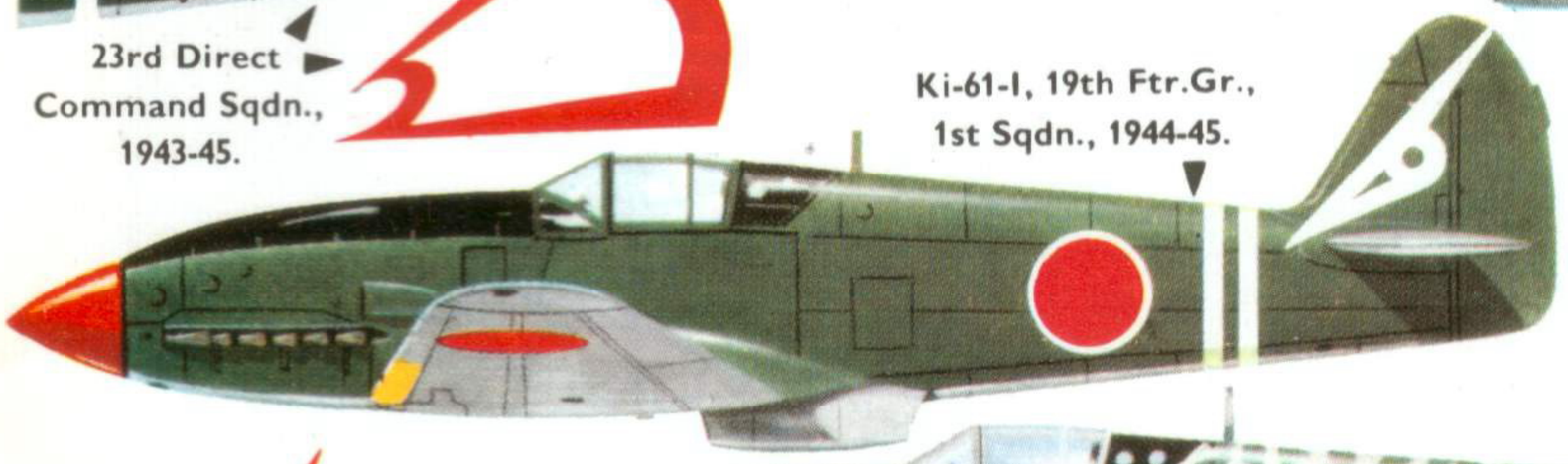




23rd Direct Command Sqdn., 1943-45.

Ki-61-I, 37th Ftr.Gr., Matsuyama airfield, Formosa, March 1944.

Ki-61-I, 19th Ftr.Gr., 1st Sqdn., 1944-45.



37th Ftr.Gr.

Ki-61-I, 19th Ftr.Gr., 2nd Sqdn., 1944-45.

19th Ftr.Gr.

Ki-61-I, 56th Ftr.Gr., 1944.

56th Ftr.Gr.

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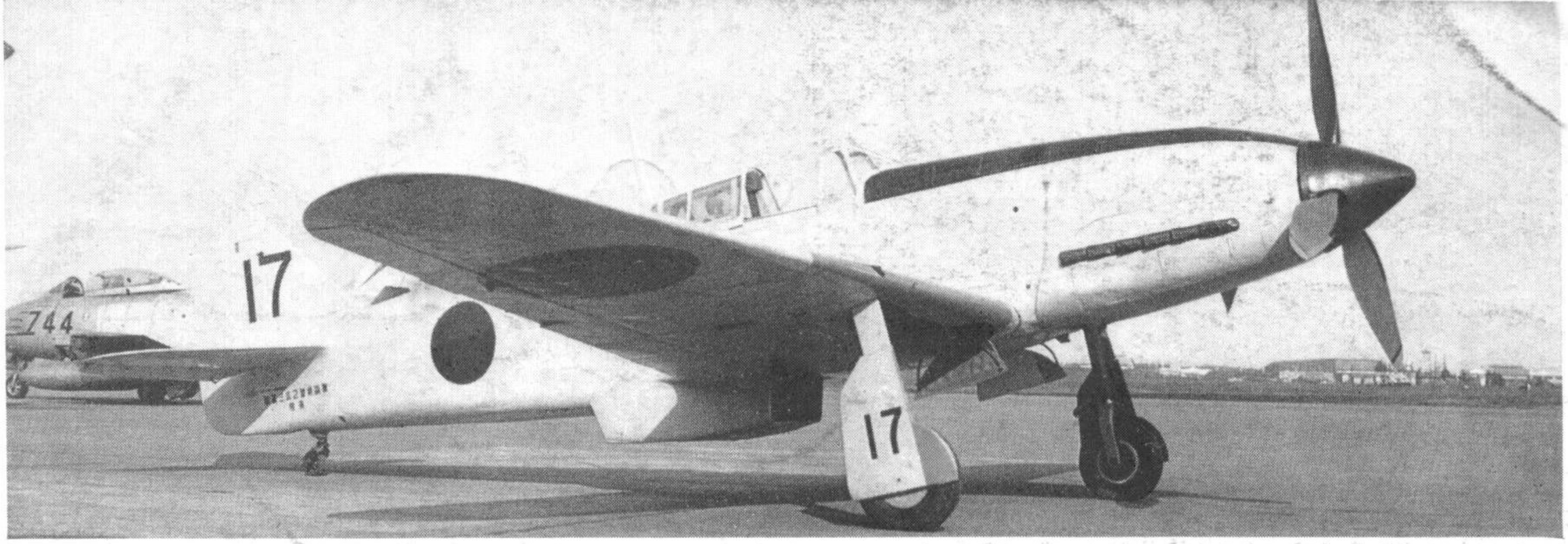

The sole surviving Hien, *a Ki-61-II KAIa presented to Japan by the U.S. Air Force and maintained in mint condition.*
(Photo: *Aireview*)

As the B-29's switched to night bombing the 244th Sentai found itself engaged against the U.S. Navy and, in February, 1945, during the first attack by Task Force 58 they met over Yokkaichi, southwest of Nagoya, a large formation of U.S. Navy aircraft. In the ensuing mêlée the 244th pilots claimed to have destroyed 12 enemy aircraft for the loss of only two of their own. However, the odds were against them as they were outnumbered in most combats and, on the ground, the aircraft had to be parked and serviced some considerable distance away from the runways at Chofu and Narumatsu to avoid detection by the omnipresent Hellcats and Corsairs.

With the war drawing to its end the B-29's returned during daylight under the cover of Iwo Jima-based P-51's. The 244th tried to stop them but the Ki-61's were no match for the Mustangs and often the *Hiens* had to be protected by the Ki-100's with which the unit was in the process of being re-equipped.

When Japan finally surrendered the 244th Sentai, along with the other fighter units of the once-proud J.A.A.F., had been beaten to their knees and flight operations had been curtailed drastically by the combined lack of experienced pilots, aircraft and petrol.

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KAWASAKI Ki-61 SPECIFICATION

	Ki-61 Prototype	Ki-61-Ib	Ki-61-I KAIc	Ki-61-II Prototype	Ki-61-II KAIa
Span	12·0 m. (39 ft. $4\frac{7}{16}$ in.)	12·0 m. (39 ft. $4\frac{7}{16}$ in.)	12·0 m. (39 ft. $4\frac{7}{16}$ in.)	12·0 m. (39 ft. $4\frac{7}{16}$ in.)	12·0 m. (39 ft. $4\frac{7}{16}$ in.)
Length	8·75 m. (28 ft. $8\frac{1}{2}$ in.)	8·75 m. (28 ft. $8\frac{1}{2}$ in.)	8·94 m. (29 ft. 4 in.)	— —	9·16 m. (30 ft. $0\frac{5}{8}$ in.)
Height	3·70 m. (12 ft. $1\frac{11}{16}$ in.)	3·70 m. (12 ft. $1\frac{11}{16}$ in.)	3·70 m. (12 ft. $1\frac{11}{16}$ in.)	3·70 m. (12 ft. $1\frac{11}{16}$ in.)	3·70 m. (12 ft. $1\frac{11}{16}$ in.)
Wing Area ...	20·0 sq. m. (215·278 sq. ft.)	20·0 sq. m. (215·278 sq. ft.)	20·0 sq. m. (215·278 sq. ft.)	22·0 sq. m. (236·8 sq. ft.)	20·0 sq. m. (215·278 sq. ft.)
Empty Weight ...	2,238 kgs. (4,934 lb.)	2,210 kgs. (4,872 lb.)	2,630 kgs. (5,798 lb.)	— —	2,840 kgs. (6,261 lb.)
Loaded Weight ...	2,920 kgs. (6,437 lb.)	2,950 kgs. (6,504 lb.)	3,470 kgs (7,650 lb.)	— —	3,780 kgs. (8,333 lb.)
Maximum Weight	— —	3,250 kgs. (7,165 lb.)	— —	— —	3,825 kgs. (8,433 lb.)
Wing Loading ... (at normal loaded weight)	146 kgs./sq. m. (29.9 lb./sq. ft.)	147·5 kgs./sq. m. (30·2 lb./sq. ft.)	173·5 kgs./sq. m. (35·1 lb./sq. ft.)	— —	189 kgs./sq. m. (38·8 lb./sq. ft.)
Power Loading ... (at normal loaded weight and take-off rating)	2·49 kgs./h.p. (5·48 lb./h.p.)	2·51 kgs./h.p. 5·53 lb./h.p.	2·94 kgs./h.p. (6·48 lb./h.p.)	— —	2·52 kgs./h.p. (5·56 lb./h.p.)
Fuel Capacity:					
Internal ...	550 litres (145 U.S. gallons)	550 litres (145 U.S. gallons)	550 litres (145 U.S. gallons)	550 litres (145 U.S. gallons)	550 litres (145 U.S. gallons)
Drop Tanks ...	— —	2×200 litres (2×53 U.S. gallons)	2×200 litres (2×53 U.S. gallons)	2×200 litres (2×53 U.S. gallons)	2×200 litres (2×53 U.S. gallons)
Engine	Ha-40	1,100 h.p. Army Type 2	1,100 h.p. Army Type 2	Ha-140	Ha-140
Take-off Rating ...	1,175 h.p. at 2,500 r.p.m.	1,175 h.p. at 2,500 r.p.m.	1,180 h.p. at 2,500 r.p.m.	1,500 h.p. at 2,750 r.p.m.	1,500 h.p. at 2,750 r.p.m.
War Emergency Rating	—	1,080 h.p. at 3,500 m. (11,480 ft.)	1,100 h.p. at 3,900 m. (12,795 ft.)	1,250 h.p. at 5,700 m. (18,700 ft.)	1,250 h.p. at 5,700 m. (18,700 ft.)
Maximum Speed ...	591 km./h. at 6,000 m. (367 m.p.h. at 19,685 ft.)	592 km./h. at 4,860 m. (368 m.p.h. at 15,945 ft.)	590 km./h. at 4,260 m. (366 m.p.h. at 13,980 ft.)	—	610 km./h. at 6,000 m. (379 m.p.h. at 19,685 ft.)
	523 km./h. at 10,000 m. (325 m.p.h. at 32,810 ft.)	—	580 km./h. at 5,000 m. (360 m.p.h. at 16,405 ft.)	—	—
	—	—	—	—	—
Cruising Speed ...	—	400 km./h. at 4,000 m. (249 m.p.h. at 13,125 ft.)	—	—	—
	—	—	—	—	—
Climbing Speed:					
Altitude ...	10,000 m. (32,810 ft.)	5,000 m. (16,405 ft.)	5,000 m. (16,405 ft.)	—	5,000 m. (16,405 ft.)
Time	in 17 min. 14 sec.	in 5 min. 31 sec.	in 7 min.	—	in 6 min.
Service Ceiling ...	11,600 m. (37,730 ft.)	11,600 m. (37,730 ft.)	10,000 m. (32,810 ft.)	—	11,000 m. (36,090 ft.)
Range:					
Normal ...	—	600 km. (373 mi.)	—	—	1,100 km (684 mi.)
	—	—	—	—	—
Maximum ...	—	1,100 km. (684 mi.)	1,800 km. (1,120 mi.)	—	1,600 km. (995 mi.)
	—	—	—	—	—
Armament:					
Fuselage ...	2×12·7 mm. Type 1	2×12·7 mm. Type 1	2×20 mm. Ho-5	2×20 mm. Ho-5	2×20 mm. Ho-5
Wing	2×7·7 mm. Type 89	2×12·7 mm. Type 1	2×12·7 mm. Type 1	2×12·7 mm. Type 1	2×12·7 mm. Type 1
Bombs	—	—	2×250 kgs.	—	2×250 kgs.
	—	—	(2×551 lb.)	—	(2×551 lb.)

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